Safety Evaluation

Safety Evaluation Number[1]: SE-W375-00-00018 Revision No: 0

ABCN Number: ABCN-W375-00-00026

Safety Evaluation Subject: Part A HAR Significant and Bounding Hazard Evaluations & ISAR Fundamental Aspects of Design

PART I: DESCRIPTION OF THE PROPOSED REVISION, BACKGROUND, AND SCHEDULE

1. Describe the proposed revision (including credible failure modes, if applicable).

   a) Adds Appendix E, Significant and Bounding Hazard Evaluations," to the Part A Hazard Analysis Report (BNFL-5193-HAR-01, Rev. 0).

   This appendix identifies the changes to the significant and bounding hazard evaluations that have occurred since approval of the Part A HAR as a result of design changes and of hazard evaluations conducted during ISM Cycles I and II.

   b) Adds Appendix A to the Initial Safety Analysis Report (ISAR) (BNFL-5193-ISAR-01, Rev.0) that identifies, verbatim, the first occurrences of Fundamental Aspects of Designs portions of the ISAR that are considered to be part of the authorization basis. Appendix A identifies the Fundamental Aspects of Design (FAD) contained in the body of the ISAR and shows the changes to the FAD due to the Part B1 design development changes to the plant design, process descriptions and arrangement. The changes involve:
      1. Separation of the process building into four separate buildings with specific process functions
      2. Providing separate storage areas for failed melters, spent melters, and secondary radioactive waste
      3. Providing holdup receipt of LAW waste transfer changes from DOE
      4. Providing treatment and temporary storage of HLW solids
      5. Combined Solids and Strontium/TRU precipitate removal
      6. Changes to the LAW Vitrification facility building layout, in-cave mechanical design philosophy, and melter shielding
      7. Revised classification of SSCs to be consistent with the SRD classification of Safety Design Class and Safety Design Significant.
      8. Clarifying the cascading ventilation design philosophy, including the lack of filtered exhaust for portions of the C2 HVAC systems that have low contamination potential.

   This revision is a composite of the changes required to update the HAR and the ISAR portions considered to be authorization basis to reflect the current plant configuration and hazard analysis. Only the portions of the HAR that are identified as significant and bounding hazards and the ISAR portions that are identified as fundamental aspects of design are revised.

2. Identify the affected Authorization Basis (AB) documents and perform a comparison and assessment of the revision against the AB.

   a) BNFL-5193-HAR-01, Rev.0, *TWRS-P Hazard Analysis Report*, September 26,1997, including revisions to HAR Chapter 6 transmitted via letter 5193-97-0511.

   By RU letter 99-RU-0338 (dated June 10, 1999), the RU approved the authorization basis amendment request for the ISMP to state that only the parts of the Hazard Analysis Report (HAR) that address significant or bounding hazard evaluations are considered a part of the authorization basis. ISMP section 3.3.1, "Content of the Authorization Basis," subsection 3.3.1.8, states: "Those portions of the Part A Hazard Analysis Report (HAR) that constitute bounding or significant hazards or hazardous situations are considered to be part of the authorization basis."

   However, the HAR does not specifically identify the significant and bounding hazard evaluations. The new

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Appendix E identifies changes to the significant and bounding hazard evaluations that have occurred since approval of th Part A HAR, Rev.0, such that the current Authorization Basis is identified.

b) BNFL-5193-ISAR-01, Rev. 0, *TWRS-P Project Initial Safety Analysis Report*, January 12, 1998.

Changes to the facility design, process and arrangement as a result of the Part B1, design development phase of the project that affect the fundamental aspects of design are shown by strikeout and underlined additions in Appendix A.

1. Sections 1.1.1, 1.1.1.1, 3.2.7, and Figure 1-1, describes the "process building" for HLW/LAW option as one structure. This change shows the current layout as four separate structures each housing a portion of the process previously contained in the single process building. The function of the four separate buildings is the same as the single building to the degree that individually they provide the confinement necessary for the associated process hazards. Each of the four buildings is designed to the appropriate standards identified in the SRD based on the classification of the building and the hazards contained.

2. Sections 1.1.1 and Figure 1-1 describe the buildings that provide for transfer or storage of hazardous and radiological materials. Optimization of the HLW melter breakdown area has resulted in separate storage areas for failed HLW melters and secondary waste storage that are away from the main operating equipment areas. A separate area for staging of spent melters prior to shipment is also provided. This arrangement results in the independent storage of radioactive materials that reduces space demands and interactions with the process areas of the plant.

3. Sections 1.0 and 1.1.2.2 describe the receipt of LAW feeds. This change revised the method of LAW transfer by eliminating the operation of tank (DST) 241-AP-106 from BNFL's scope and transferring LAW directly to the Pretreatment Building. Additional holdup receipt capacity was provided for the LAW waste transfers from DOE. Although the inventory of the LAW waste has increased, there are no changes to the applicable SRD standards. The same level of confinement is provided to the additional receipt vessels.

4. Sections 1.0, 1.1.2.2, and 4.2.1.1 describe the handling of HLW waste stream. This change provides for the treatment and temporary storage of HLW solids based on the phased startup of the vitrification facilities. Storage and treatment of HLW solids has been added which increases the inventory of HLW waste. However, there is no change to the applicable SRD standards for HLW treatment. The confinement design is appropriate for the classification and hazards identified.

5. Section 1.1.2.2 2) describes the process for sequential separation of LAW entrained solids and strontium/TRU precipitate. This change combined Solids and Strontium/TRU precipitate removal based on the results of studies showing that the sequential removal of the entrained solid and then strontium/TRU precipitate was impractical and unnecessary since these products would be combined later for HLW vitrification. This change was a process description change that resulted in no change to the end product of LAW treatment and did not result in any equipment changes.

6. Section 4.2.1.1, Process Building, states that the immobilization area includes remotely operated vitrification systems contained in … concrete cells. Radiation shielding for the LAW melters has been changed from concrete cells to metal shielding surrounding each melter. These shielding changes will maintain external occupational radiation exposures ALARA.

7. Section 3.3.6 describes the design classification requirements for Design Class I and Design Class II SSCs. This change revises these classifications to Safety Design Class (SDC) and Safety Design Significant (SDS). These changes to the original categorization of SSCs important to safety were replaced with new terms described in Appendix 1A (BNFL letter W338-98-0004) and clarifications provided in BNFL letter W338-

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0011 which were reviewed by the RU as part of the ISAR evaluation. However, Section 3.3.6 of the ISAR was not revised. The revised classification of SDC and SDS have been approved by the RU and incorporated into the SRD Rev.2d including classification method and requirements. To preclude conflict with other AB documents, only the definitions for the new classifications (Safety Design Class and Safety Design Significant) have been revised by this change with reference made to SRD Appendix A for classification methods and requirements.

8. Section 5.6 describes the cascading ventilation design philosophy for designated process areas and to protect the facility and co-located workers. This change clarifies that area of no or low potential for radiological contamination that are isolated from other radiological contaminated areas (i.e. do not provide cascading ventilation) and are shown to have no or low potential for radiological contamination do not require filtered exhaust. This applies to C2 HVAC systems that do not have communication with adjacent contaminated areas and have low contamination potential.

3. List the references used for the safety evaluation.

RU letter 99-RU-0338, June 10, 1999, "Authorization Basis Amendment Request, ABAR-W375-99-0005" (CCN # 004000)

BNFL-5193-ISP-01, Rev. 4b, November 9, 1999, *TWRS-P Integrated Safety Management Plan*, BNFL Inc., Richland, Washington

BNFL-5193-HAR-01, Rev. 0, September 26, 1997, *TWRS-P Hazard Analysis Report*, BNFL Inc., Richland, Washington

BNFL letter 5193-97-0511, "Proposed Revision to Hazard Analysis Report Section 6.0," October 16, 1997 (RIDS # P1.12.4; Document # 1997100151)

BNFL-5193-SRD-01, Rev. 2e, November 9, 1999, *TWRS-P Safety Requirements Document*, BNFL Inc., Richland, Washington

DOE/RL-96-0004, Rev. 1, July 1998, *Process for Establishing a Set of Radiological, Nuclear and Process Safety Standards and Requirements*

BNFL-5193-ISAR-01, Rev.0, January 12,1998, *TWRS-P Project Initial Safety Analysis Report*, BNFL Inc., Richland, Washington

DCA-99-00004 Separation of PT/HLW/LAW

TR-W375-BF-PCA-00197, Spent Melter Staging (LAW)

TR-W375-HV-PCA-00295, HLW Failed Melter Store

TR-W375-BF-PCA-00388, (DRAFT) Central Waste Stores

DCA-W375-99-00050, Add Six LAW Feed Receipt Vessels to the Pretreatment Building

DCA-W375-99-00003, HLW Feed Receipt & Pretreatment Design Changes

DCA-W375-99-00008, LAW Vitrification Hands-on Operation and Maintenance

SD-W375PT-PR00013, System Description For Law Ultrafiltration-System PT-230

BNFL letter W338-98-0004, Response to Regulatory Unit Letter 98-RU-0038 requesting written information and

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presentation on BNFL Safety Approach and Methodologies, dated 2/29/1998

BNFL Letter W338-98-001, Response to RL/REG-98-01 Draft …., dated 3/3/1998

RL/REG-98-09, RU Initial Safety Evaluation Report of the BNFL Inc. Initial Safety Assessment, dated March 1998

DWG-W375BF-C00002, RPP-WPT Site Plot Plan Rev.H

BNFL-RPT-007 Rev.0, Washing of the AN-107 Entrained Solids, dated Aug, 1999 by PNNL G.J. Lumetta

BNFL-RPT-0027 (Draft) Combined Entrained Solids and Strontium/TRU Removal from AN-107 Diluted Feed, dated 2/2000 by PNNL R.T. Hallen.

4. Describe the planned revision implementation schedule.

Appendix E will be incorporated into the Part A HAR within 30 days of RU approval.

Appendix A to be incorporated into the ISAR within 30 days of RU approval.

PART II: REGULATORY IMPACT OF PROPOSED AB REVISION

The following questions are to be answered as part of the safety evaluation, to determine if the proposed AB revision (and the proposed initiating change if applicable) requires prior RU approval.

	YES	NO
1. Does the revision involve the deletion or modification of a standard previously identified or established in the approved SRD?	☐	☒

JUSTIFICATION:

Although the significant and bounding hazard evaluations in the Part A HAR are an input to the selection of SRD requirements or standards, no previously identified or established standards in the SRD are being modified or deleted by this revision.

The design changes that affect the fundamental aspects of desing are design to the appropriate standards identified in the SRD and do not change or modify the standards previously identified.

2. Does the revision result in a reduction in commitment currently described in the AB?	☒	☐

JUSTIFICATION:

This revision identifies the changes to the significant and bounding hazard evaluations that have occurred since approval of the Part A HAR. In some cases, new hazards are identified. Also, the consequences of some hazard evaluations have increased. The RU interprets such changes as a reduction in commitment.

In addition, because the design changes related to the following ISAR fundamental aspects of design caused or contributed to new or changed significant and bounding hazard evaluations, they also constitute a reduction in commitment:

3. Providing holdup receipt of LAW waste transfer changes from DOE

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	YES	NO
4. Providing treatment and temporary storage of HLW solids **6. Changes to the LAW Vitrification facility building layout and in-cave mechanical design philosophy.**		
3. Does the revision result in a reduction in the effectiveness of any program, procedure, or plan described in the AB. JUSTIFICATION: **With respect to the HAR, the affected program described in the AB is the process of identifying safety standards and requirements, in accordance with DOE/RL-96-0004, Rev. 1 (which RPP-WTP refers to as Integrated Safety Management). This revision identifies changes in significant and bounding hazard evaluations that have occurred since approval of the Part A HAR as a result of further hazard analysis during ISM Cycles I and II. DOE/RL-96-0004, Rev. 1, and the BNFL Inc. implementing standard, SRD Vol. II, Appendix A, both note that the ISM process is an iterative one that takes place over the life of the project. That is, the process is intended to be further refined as the design evolves. Hence, this revision implements the ISM program as intended and is not a reduction in effectiveness.** **Changes to the classification of SSCs were previously reviewed and approved as part of the RU review of the ISAR Appendix 1A and documented in RL/REG-98-09. The body of the ISAR that was identified as fundamental aspects of design is being updated to reflect the classification of SSCs contained in Appendix 1A. There are no design changes that affect any program, procedures, or plans previously reviewed that are described as a fundamental aspect of design.**	☐	☒

Note: Guidance on defining the terms and responding to the above questions is provided in K70C528, Code of Practice for Managing Changes to the Authorization Basis, Appendix 6.

If all the answers to the above questions are no, then the change can be made without prior RU approval.

If any of the above answers is yes, then RU approval is required prior to implementation of the AB revision (and the initiating change if applicable). An ABAR shall be prepared to obtain RU approval (see K70C528, Appendix 7.)

PART III: SAFETY EVALUATION CONCLUSION

☐ All PART II questions are answered No. Therefore, RU approval is NOT required prior to implementing the proposed AB revision (and initiating change where applicable).

☒ At least one PART II question is answered Yes. Therefore, RU approval IS required prior to implementing the proposed AB revision (and initiating change where applicable). Issuance of an ABAR is required to obtain RU approval.

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Evaluator/Originator	Date
Reviewer[2]	Date
Radiological, Nuclear, and Process Safety Manager	Date
Chair, Project Safety Committee[3]	Date
RPP-WTP General Manager[3]	Date

[2] The reviewer should be a person from the same department as the Evaluator/Originator and at least as qualified as the Evaluator/Originator to conduct safety evaluations.

[3] This signature required if Safety Evaluation concludes AB change can be made without RU prior approval. If RU approval (ABAR) is required, PSC and GM signatures occur on the ABAR.